The Information Processing Model:

A way to think about how you learn and what it means for studying, writing, and test-taking in college
What is “learning”, anyway?

Learning involves processing new information using your existing knowledge until the new info becomes part of the knowledge and can be used.

If we understand how learning works, we can make better choices about what, where, when and how to do the learning.
Let’s start with some important terms:

**Memory:**
The brain functions that are involved with sensing, thinking about, storing and retrieving information.

**Working Memory/short-term memory**
Function in which your brain interprets new information and connects it to knowledge base.

**Long-term memory**
Where learned information is stored for later use.

“**Memory pathways**” or “**Neural Pathways**”
Neural connections that are formed, strengthened or weakened based on what you think about or do, and how often you do it.
One more term:

“Keep the wheels turning”

...is an easy way to think about the cognitive work involved in learning as “turning the wheels.” *Turning wheels* is a metaphor for the “work” in *working memory*.

A way to know if something you are doing will produce learning is to consider whether it “keeps the wheels turning.” If you are thinking about the information, you are turning the wheels.
Building awareness about learning

When we understand how our brains learn, we can make much more effective choices about what *kinds* of studying activities to do. For example:

To create a strong memory of a new concept, the brain needs to not only *read* or *hear* new information, but also actively *think about* what the information means, *both by itself and in relation to other things.*

This is why simply reading a text or listening to a lecture does not work well for memorizing.

When students make notes, discuss, or write questions and answers on what they are reading, they give their brains the stimulation it needs to do its best learning work.

Working memory: Use it or lose it

*Working memory* is the part of the memory system where what you know and what you don’t know meet. Working memory uses existing knowledge to think about the new information. It’s where learning happens. When new information enters the working memory, it activates knowledge. But without rehearsal, the information gets dropped within a few seconds.

Information Processing Model: A way of thinking about the learning process

“Wheel turning” leads to encoding memories

No “Wheel turning” leads to instant forgetting
LEARNING IN FIVE STEPS

1. **Info received:** Your brain constantly sees, hears, smells, touches, tastes new information.

2. **Brain focuses:** You choose to focus on some stimuli and ignore the rest.

3. **Knowledge retrieved:** Your brain activates knowledge to help process new info.

4. **Rehearsal:** To make a memory, you MUST think in ways that connect new information to existing knowledge.

5. **Encoded:** By processing new information with old knowledge, you ‘encode’ new information as a memory. It becomes new knowledge.

**Forgetting:** Brain doesn’t retain the things you don’t focus on or process.
Trouble Spots
Common problems in the learning process

Problems with Maintenance: Memory pathways need to be used, or they weaken

Problems with Elaboration: More thinking is needed to strengthen connections

Problems with Attention: Problems staying focused or switching focus; distractions;

Problems with Encoding: Misunderstanding. New info matched to erroneous knowledge. Problems thinking lead to development of erroneous knowledge

Problems with Retrieval: Memories become harder to find due to weakened or disconnected pathways
The “forgetting curve” illustrates how quickly unrehearsed information is forgotten. Note the steep decline in the first day after something is learned. Note also that each rehearsal not only restores the knowledge, but slows the rate of forgetting. This is because rehearsal strengthens the neurological connections that the brain uses to retrieve the knowledge.
Trouble Spots
Problems students face in information processing

People commonly have difficulty learning from new information when:

• They don’t have the knowledge needed to make sense of new info
  (Ex.: Someone explains something in a language you don’t speak)
• They have the knowledge, but the new info doesn’t connect with it easily
  (Ex.: Someone tried to explain something and you don’t get it, then they find a more relatable example and you get it)
• The needed knowledge exists, but has been “forgotten”
  (Ex.: You are learning about something you once could do, but haven’t done in years).
• The ability to **think** in the most effective ways also needs practice (Ex.: You understand the new info, but it’s hard to think about it in the way your professor asks you to)
Strategies for overcoming common difficulties include:

• **Working on smaller amounts of new information at a time**
  (Ex.: Study for shorter blocks of time, but more often)

• **Focusing more time on retrieval and rehearsal practice**
  (Ex.: making and answering questions, putting notes in own words)

• **Testing your ability to remember what your notes mean**
  (Ex.: explaining your notes in detail, then looking up what you miss)

• **Practicing Higher Order thinking**
  (Ex.: Going beyond the facts. Factually, a wedding ring is a ring that indicates you are married. Conceptually, a wedding ring represents all sorts of traditions and values. Your professor asks about this stuff.)
Your brain learns **best** when it does more recall of relevant prior knowledge and more thinking about the target information.

In other words, learning happens when you **strive** to **remember** and **think** – even when you just learn something new, you should recall it and use it **right away** to build understanding and strengthen memory (see “the forgetting curve”).

**Striving** is important. The best memory strengthening work happens when remembering is most difficult.
OK, so (pt. 2):

An **ideal** approach to learning in college

a.) **Builds** new memories through info processing activity, then

b.) **Recalls** and **re-uses** those memories in an ongoing way, to **strengthen the pathways** and **make future recall easier**.

**Remember:**

- Learning is a **physical activity**! It affects your brain like lifting with weights can affect your muscles. The more you do, the easier it becomes.